

FUNDAMENTALS

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MODULE 9 : BUILDING REGULATIONS UPDATE

Part L Building Regulations Update

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The Building Regulations sets legal minimum standards for all aspects of building construction for both new build and refurbishment. The regulations are enforced by local authorities and set in England by Department for Communities and Local Government and in Wales by The Planning Inspectorate. Scotland and Northern Ireland have their own versions of the Building Regulations. In the case of the 2013 revision though Part L only applies to England, and not Wales, which is producing its own update.

The most relevant aspect of the buildings regulations to readers is likely to be Part L. Part L of the Building Regulations – Conservation of Fuel and Power to give it its full title was first introduced in 1995. The clear objective of the Part L is to improve the energy efficiency of Britain's building stock. It is generally recognised that British homes are amongst the least energy efficient in Europe. The introduction of Part L was originally driven, partly by concerns over fuel poverty and partly by the UK's commitment to the Kyoto agreement to reduce carbon emissions. The key driver now which has had a significant effect on Part L is the European Energy Performance in Buildings Directive (EPBD).

Part L is a fairly complex document and its interpretation requires a high degree of prior building services engineering and construction technology knowledge. This article makes no attempt to explain the regulations but merely to summarise the updates.

There have been 5 revisions to Part

L in 2002, 2005, 2006, 2010 and the most recent in 2013. Each revision has required successively lower energy use.

The latest revisions include:

- new 2013 versions of Approved Document L1A and L2A;
- amendments to the 2010 versions of Approved Document L1B and L2B
- new 2013 version of the Domestic Building Services Compliance Guides;
- new 2013 version of the Non-Domestic Building Services Compliance Guides.

These changes come into effect from 6 April 2014. This delay is to satisfy the moratorium on new regulations for small (micro) businesses announced in 2010.

New documents energy managers should be aware of:

- Approved Document L1A – Conservation of fuel and power in new dwellings
- Approved Document L1B – Conservation of fuel and power in existing dwellings
- Approved Document L2A – Conservation of fuel and power in new buildings other than dwellings
- Approved Document L2B – Conservation of fuel and power in existing buildings other than dwellings
- Non-domestic Building Services Compliance Guide
- Domestic Building Services Compliance Guide.

The objective of the revisions is to continue to raise standards. In this latest revision the changes could fairly be described as subtle. There is also an attempt to pave the way for future changes.

In the 2013 budget the government restated its commitment to achieve zero carbon in new buildings by 2016. In 2006 the stated aspiration of Part L was that by 2016 all new homes would be zero carbon.

The underlying principle of successive editions of Part L, is progressive reductions in energy consumption and carbon emissions.

The European Commission Energy Performance in Buildings Directive (EPBD) requires 'nearly zero energy' buildings from 2020. Provision is made in the 2012 Building Regulations to achieve this, however this does not come into force until the end of 2020. This latest revision of Part L moves further down the path towards this: Regulation 25B stating, 'Where a building is erected, it must be a nearly zero-energy building.' The regulation is clear however that it will not come into force until 2019 at the earliest.

It does seem likely that there will be much discussion, consultation and debate and on Part L and how 'zero carbon', or 'nearly zero energy' buildings will be achieved. It is worth noting that zero carbon is quite different to nearly zero energy. Nearly zero energy is likely to be much more expensive than zero carbon. Zero carbon can be achieved, for instance using photo voltaic, solar thermal and biomass heating.

This round of revisions to the building regulations has almost certainly been 'reined in' by the UK's current financial situation.

The government has stressed that Part L takes into account the need to improve energy efficiency

but in the light of financial growth considerations i.e. if we make it too expensive we might limit the speed of economic growth.

It has been estimated that the 9 per cent upgrade for non-domestic buildings would achieve energy savings of £604 million for incremental costs of £604m. A more substantial 20 per cent upgrade would it is estimated more than double the energy savings to £1,302m but would also increase incremental costs even more to £1,485m.

Notational dwelling

A brief summary is given here with more detail provided later:

- a new regulation 25A requires new dwellings to achieve or better a dwelling fabric energy efficiency target (DFEE) in addition to the carbon dioxide target;
- the notational dwelling used to determine carbon dioxide and fabric energy efficiency targets is the same size and shape as the actual dwelling constructed to a concurrent specification. The CO₂ emissions saving has been raised to 6 per cent;
- the notational dwelling is summarised that will meet the CO₂ and DFEE targets and the limiting value for individual fabric elements



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and building services;

- the feasibility of high efficiency alternative systems must be taken in account;
- the guidance for insulation of heating pipe work within communal spaces is given greater prominence;
- a wider set of compliant notional buildings has been defined; and
- a summary of the Part L 2013 notional buildings is provided.

The increase in the required improvement in energy performance of new buildings varies widely dependent on building type. This is shown in the table above:

Improvements required

The improvements required for new non-domestic buildings vary according to the type of building. The apparent reason for these differences is that it is easier and more cost effective to achieve reductions in energy consumption in some types of building than in others.

For non-domestic buildings, the intention is that the aggregate uplift in energy performance across the build mix will be 9 per cent.

For new homes the aggregate figure is 6 per cent across the building mix, depending on whether the home is a detached house, in a terrace or in an apartment block.

To support these changes there will be a wider range of notional non-domestic buildings - including smaller warehouses, top-lit and side-lit buildings.

A significant addition to the Approved Document is a summary of key characteristics of notional buildings with full details to be included in the National Calculation Methodology Modelling Guide.

There are changes to the standards for building services.

A key change to the definitions has been made meaning that the term fixed building services now refers to 'any part of, or any controls associated with' and not just an entity such as a lighting luminaire or lamp or a boiler or heat exchanger. So now Part L covers 'systems' rather than 'components'.

The savings to be gained from improved control of building services are very substantial and emphasise the much argued point

Distribution warehouse	4%
Deep-plan office with air conditioning	12%
Retail warehouse	8%
Shallow - plan office	13%
Hotel	12%
School	9%
Small warehouse	3%
Aggregate across build mix	9%

that equipment efficiency must be complemented by system efficiency.

The new regulation means that the technical, environmental and economic feasibility of high-efficiency alternative systems must be considered, rather akin to the London Plan. These include:

- decentralised energy supply systems based on energy from renewable sources;
- cogeneration;
- district heating or cooling based, entirely or partly on renewable sources; and
- heat pumps.

When it comes to lighting there are now two possible approaches to compliance. One is to achieve an installed load of 60 lm per circuit watt, up from 55 lm per circuit watt.

The alternative option for compliance is the introduction of the Lighting Energy Numerical Indicator, or 'LENI' as an alternative compliance option for lighting. The LENI approach makes it possible to take into account how lighting is actually used rather than just the energy used by lamps when they are switched on. Controls come into prominence, both to dim lights in response to available daylight and to sense occupancy.

Limiting Fabric Parameters

Roof	0.2 W/m ² K
Wall	0.3 W/m ² K
Floor	0.25 W/m ² K
Party Wall	0.20 W/m ² K
Windows, Doors	2.0 W/m ² K
Air permeability	10 m ³ /hr.m ²

Table courtesy DECC

The LENI method calculates the performance of lighting in terms of kWh/m²/Yr.

Automatic lighting control is now common practice and is widely accepted. With effective control, a lighting efficiency as low as 42 lm per circuit watt is permissible. This level of control requires naturally lit spaces to have constant lighting level switching and dimming, with or without over-ride, and for lighting in unoccupied spaces to be switched on manually and off automatically.

Standards for chillers and fan coil units have also seen some alteration or 'strengthening'. These amendments are contained within the non-domestic compliance guide.

Changes have also been made in the way building fabric is dealt with. The concept of an elemental recipe has been introduced that will

Some Key Features of the Elemental Recipe

Opening Areas	Same as actual up to 25 per cent of floor area
Ext. Walls (W/m ² K)	0.18
Party Walls (W/m ² K)	0
Floor (W/m ² K)	0.13
Roof (W/m ² K)	0.13
Windows (W/m ² K)	1.4
Air tightness (m ³ /hr.m ²)	5.0
Thermal bridging(W/m ² K)	Calculated using the lengths of junctions in the actual dwelling and the psi values provided in Appendix R
Ventilation type	Natural (with extract fans)
Gas boiler	89.5 per cent (SEDBUK)

provide a compliant solution. The recipe is based on an up-to-date fabric and service specification with no improvement factor. The notional dwelling is the same shape and size as the actual dwelling and based on a set of current fabric and service specifications. The recipe is not prescriptive and may not be the most cost-effective solution for all projects. The recipe is intended to provide a reasonable starting point for builders to develop their own solutions.

For dwellings only there is now an additional requirement that not only does the building have to meet the Target Emission Rate (TER) expressed as KG/m²(floor area)/Yr but it must also meet the Target Fabric Energy Efficiency Rate (TFEE) expressed as kWh/m²(floor area)/Yr.

The TFEE is determined by calculating the Dwelling Fabric Energy Efficiency (DFEE) level from the elemental recipe and then increasing the energy demand by 15 per cent.

There has been a change in the way that district heating is treated in that the CO₂ factor used may be lower than the notational value thus giving some CO₂ emission benefit to the building.

Accredited construction details have been removed from the approved document. No quality assured accredited construction details have been approved by the Secretary of State.

There have been numerous changes to the non domestic compliance guide, in general to align the regulations to the requirements of the EPBD:-

All heating pipe work that passes through communal spaces must now be insulated. This is to avoid overheating.

Standards have been raised in domestic wet systems particularly in the area of controls e.g. boiler interlocking, HWS temperature control, thermostatic radiator valves.

As for heat pumps, new tables are provided relating performance to primary energy use:

The term seasonal primary energy efficiency ratio (SPEER) is an emerging figure reflecting the use of primary energy for all types of heat pump, fossil fuel, boiler and gas-driven cogeneration technologies. Energy

Domestic Heat Pumps

Heat pumps - electrically driven		Coefficient of Performance (COP)	
		New build	Existing build
Air - to - Air	Space heating ≤ 12kW	SCOP 'D' rating for the median temperature range in EN 14825	
All others	Space heating	2.5 at rating conditions in EN 14511	2.2 at rating conditions in EN14511
	Domestic hot water	2.0 at rating conditions in EN14511	

Table courtesy AECOM

Non - Domestic Heat Pumps

Heat pump units		COP (Heat generator efficiency)
Air to Air	Space heating ≤ 12kW	SCOP 'D' rating for the median temperature range in EN 14825
All others except absorption and gas engine	Space heating	2.5 (250 per cent) at rating conditions in EN 14511
	Domestic hot water	2.0 (200 per cent) at rating conditions
Absorption		0.5 (50 per cent) when operating at the rating conditions
Gas - engine		1.0 (100 per cent) when operating at the rating conditions

Table courtesy AECOM

Resultant Notional Building for 9 per cent Aggregate Reduction

Element	Side lit or unlit (heating only)	Side lit or unlit (includes cooling)	Top lit
Roof U Value W/m ² K	0.18	0.18	0.18
Floor U Value W/m ² K	0.26	0.26	0.26
Window U Value W/m ² K	0.22	0.22	0.22
G Value	1.6 (10 per cent FF)	1.6 (10 per cent FF)	N/A
Light Transmittance (per cent)	40 per cent	40 per cent	N/A
Roof light U Value	71 per cent	71 per cent	N/A
G Value (per cent)	N/A	N/A	N/A
Light Transmittance (per cent)	N/A	N/A	N/A
Air - permeability (m³/m²/hour). Note GIA = Gross Internal Area			
GIA ≤ 250m ²	5	5	7
250m ² <GIA ≤ 3,500m ²	3	3	7
3,500m ² <GIA ≤ 10,000m ²	3	3	5
10,000 ² <GIA	3	3	3
Lighting Luminaire (lm circuit watt)	60	60	60
Occupancy control (Yes/No)	Yes	Yes	Yes
Daylight control (Yes / No)	Yes	Yes	Yes
Maintenance Factor	0.8	0.8	0.8
Constant illuminance control	No	No	No
Heating efficiency	91 per cent	91 per cent	91 per cent
Central SFP (W/l/s)	1.8	1.8	1.8
Terminal Unit SFP (W/l/s)	0.3	0.3	0.3
Cooling (SEER/SSEER)	N/A	4.5/3.6	4.5/3.6
Cooling (mixed mode) (SSEER)	N/A	2.7	2.7
Hear recovery efficiency (per cent)	70 per cent	70 per cent	70 per cent
Variable speed control	Yes	Yes	Yes
Demand control ventilation	Yes	Yes	Yes

Table courtesy DECC

labelling with the SPEER will be mandatory from 2015.

Changes in the provision of information have also been made including:

- the need for floor plans to show main heating and ventilation components
- the need to explain how to operate and maintain building services; and
- the requirement o signpost other key information that should be provided such as appliance manuals and the EPC recommendations report.

To reflect the changes in Part L the two calculation methodologies / software, the Standard Assessment Procedure (SAP) and Simplified Building Energy Model (SBEM) are also in the process of being modified and reissued.

Both of these methodologies are derived from the National Calculation Methodologies (NCM), news of which may be found at <http://www.ncm.bre.co.uk/>

Details of SAP can be found at <http://www.ncm-pcdb.org.uk/sap/index.jsp>

The key changes to SAP include:

- updated fuel prices, primary energy and CO₂ factors;
- use of regional weather for wind speed and solar radiation;
- updated calculation for solar radiation;
- controls for heating and hot water systems with boilers;
- options for party wall heat loss;
- insulation of primary pipe work;
- additional options for storage heaters;
- default seasonal performance of heat pumps (and MCS credit); and
- low-temperature heat emitters

At the time of writing the final version of the amended SAP software had not been released and is expected to be made available soon.

A special version - cSBEM - has been created to accompany the revised Part L however this is not believed to be compliant and the release of a new version of SBEM 2013 Ver. 2A is awaited.

A format change has been made Approved Documents in that they are presented in single column format and therefore are easier to read on screen on a desktop, laptop or tablet.

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SERIES 11 MODULE 9: QUESTIONS

BUILDINGS REGULATIONS UPDATE

Please mark your answers on the sheet below by placing a cross in the box next to the correct answer. Only mark one box for each question. You may find it helpful to mark the answers in pencil first before filling in the final answers in ink. Once you have completed the answer sheet in ink, return it to the address below. Photocopies are acceptable.

1. What does The European Commission Energy Performance in Buildings Directive (EPBD) require by 2020 'nearly zero energy' buildings from 2020.

- Zero carbon Zero energy
 Nearly zero energy Nearly zero carbon

2. Which is more difficult and expensive to achieve?

- Nearly zero carbon Zero carbon
 Nearly zero energy Zero carbon

3. For dwellings what has the target CO2 saving been raised to?

- 10% 6% 2% 15%

4. For non-domestic buildings what has the aggregate target CO2 saving been raised to?

- 9% 6% 15% 20%

5. How does Lighting Energy Numerical Indicator, or 'LENI' specify energy efficiency?

- Circuit Watts kWh/m2/Yr
 Lumens / Watt per cent

6. What does the acronym TER stand for

- Total Energy Rate Target Energy Rate
 Target Emission Rate Total Emission Rate

7. What does DFEE stand for?

- Dwelling Final Energy Efficiency
 Dwelling Fabric Energy Efficiency
 Dwelling Future Energy Efficiency
 Dwelling Further Energy Efficiency

8. In what units is the TER expressed:

- kWh/m2/Yr kg/Yr
 kg CO2/m2/Yr kWh/Yr

9. In what units is TFEE expressed?

- kWh/Yr per cent kWh/m2/Yr kg/Yr

10. What term is an emerging figure reflecting the use of primary energy for all types of heat pump?

- Coefficient of performance
 Seasonal primary energy efficiency ratio
 Seasonal coefficient of performance
 Seasonal energy efficiency ratio

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